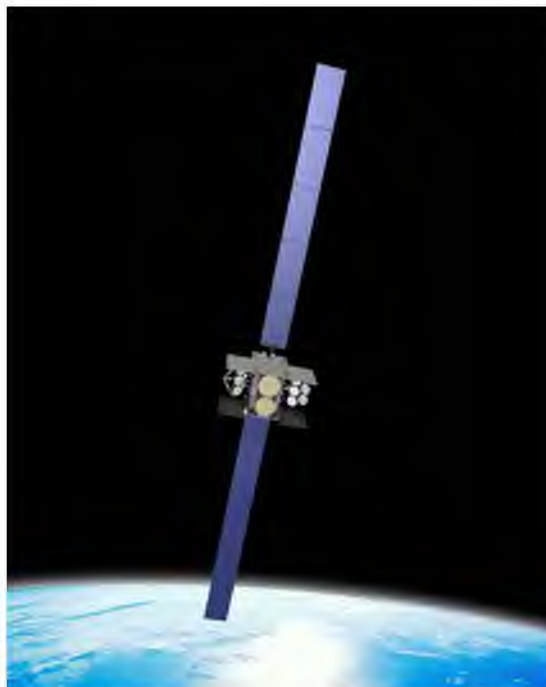


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RCS: DD-A&T(Q&A)823-326



## **Wideband Global SATCOM (WGS)**

As of FY 2021 President's Budget

Defense Acquisition Management  
Information Retrieval  
(DAMIR)

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## Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance  
ACAT - Acquisition Category  
ADM - Acquisition Decision Memorandum  
APB - Acquisition Program Baseline  
APPN - Appropriation  
APUC - Average Procurement Unit Cost  
\$B - Billions of Dollars  
BA - Budget Authority/Budget Activity  
Blk - Block  
BY - Base Year  
CAPE - Cost Assessment and Program Evaluation  
CARD - Cost Analysis Requirements Description  
CDD - Capability Development Document  
CLIN - Contract Line Item Number  
CPD - Capability Production Document  
CY - Calendar Year  
DAB - Defense Acquisition Board  
DAE - Defense Acquisition Executive  
DAMIR - Defense Acquisition Management Information Retrieval  
DoD - Department of Defense  
DSN - Defense Switched Network  
EMD - Engineering and Manufacturing Development  
EVM - Earned Value Management  
FOC - Full Operational Capability  
FMS - Foreign Military Sales  
FRP - Full Rate Production  
FY - Fiscal Year  
FYDP - Future Years Defense Program  
ICE - Independent Cost Estimate  
IOC - Initial Operational Capability  
Inc - Increment  
JROC - Joint Requirements Oversight Council  
\$K - Thousands of Dollars  
KPP - Key Performance Parameter  
LRIP - Low Rate Initial Production  
\$M - Millions of Dollars  
MDA - Milestone Decision Authority  
MDAP - Major Defense Acquisition Program  
MILCON - Military Construction  
N/A - Not Applicable  
O&M - Operations and Maintenance  
ORD - Operational Requirements Document  
OSD - Office of the Secretary of Defense  
O&S - Operating and Support  
PAUC - Program Acquisition Unit Cost

PB - President's Budget  
PE - Program Element  
PEO - Program Executive Officer  
PM - Program Manager  
POE - Program Office Estimate  
RDT&E - Research, Development, Test, and Evaluation  
SAR - Selected Acquisition Report  
SCP - Service Cost Position  
TBD - To Be Determined  
TY - Then Year  
UCR - Unit Cost Reporting  
U.S. - United States  
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)  
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)

## Program Information

**Program Name**

Wideband Global SATCOM (WGS)

**DoD Component**

Air Force

**Joint Participants**

Canada; Australia; Denmark; Luxembourg; The Netherlands; New Zealand; Norway; Czech Republic

## Responsible Office

Col John Dukes, Jr.  
483 N. Aviation Blvd.  
El Segundo, CA 90245-2802

[john.dukes@us.af.mil](mailto:john.dukes@us.af.mil)**Phone:** 310-653-1362**Fax:****DSN Phone:** 633-1362**DSN Fax:****Date Assigned:** August 1, 2019

## References

**SAR Baseline (Production Estimate)**

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated August 11, 2010

**Approved APB**

Air Force Acquisition Executive (AFAE) Approved Acquisition Program Baseline (APB) dated March 12, 2014

## Mission and Description

Wideband Global Satellite Communications (SATCOM) (WGS), previously reported as Wideband Gapfiller Satellites, is a constellation of the Department of Defense's highest capacity communication satellites. WGS augments the Defense Satellite Communications System III and the Global Broadcast Service Phase II. WGS is a fully duplexed communications platform offering warfighters a significant increase in capacity, connectivity, and interoperability. It provides high capacity and digitally channelized service at both X and Ka frequency bands, opening up a new 2-way Ka communication capability. This highly flexible communications satellite design leverages commercial processes, practices and technology to provide a wideband payload compatible with existing and future terminals. WGS provides an order of magnitude increase in communications bandwidth to our infrastructure users, Soldiers, Sailors, Airmen, and Marines.

The WGS program is partially funded via International Partnerships. In exchange for access to a portion of the WGS constellation, Australia is providing funds for WGS-6 while Canada, Denmark, Luxembourg, the Netherlands, New Zealand, and the United States are providing funds for WGS-9. Norway and Czech Republic signed the multilateral Memorandum Of Understanding on July 4, 2017 and April 9, 2017, respectively, and provided funds for access to the constellation.

On December 20, 2019, the President of the United States established the United States Space Force which assumed the responsibility for all major space acquisition programs. This program is now a United States Space Force program.



## Executive Summary

### Program Highlights Since Last Report

WGS Block I satellites became operational with WGS-1 in April 2008 (IOC was declared in January 2009), WGS-2 in August 2009, and WGS-3 in June 2010. WGS Block II satellites became operational with WGS-4 in August 2012, WGS-5 in December 2013 (FOC declared in May 2014) and WGS-6 in February 2014. WGS Block II follow-on satellites became operational with WGS-7 in January 2016, WGS-8 in July 2017, WGS-9 in October 2017 and WGS-10 in November 2019.

The WGS-6 financial data is not reported in this SAR because funding is provided by Australia in exchange for access to a portion of the WGS constellation bandwidth. Similarly, WGS-9 financial data is not reported in this SAR because funding is provided by Canada, Denmark, Luxembourg, The Netherlands, and New Zealand in exchange for access to a portion of the WGS constellation bandwidth. Norway and Czech Republic signed the multilateral Memorandum Of Understanding on July 4, 2017 and April 9, 2017, respectively, and provided funds for access to the constellation.

The FY 2018 Consolidated Appropriations Act directed the procurement of WGS 11 and 12. The Space Force plans to deliver one enhanced WGS-11+ satellite with the operational capacity of two current WGS satellites. The Air Force assessed this as the best approach to delivering the directed additional WGS capacity in a cost effective manner. A Request for Proposal was sent to Boeing Space Systems in June 2018, the proposal was delivered January 22, 2019, and the Air Force issued an Undefined Contract Action to allow Boeing to start work on April 19, 2019. The Space Force awarded the contract on February 10, 2020. The WGS-11+ System Requirements Review completed successfully on October 24, 2019. The WGS-11+ production schedule remains on track as the contractor has initiated production and prototyping of pathfinder hardware units to reduce risk for the final production build. The Space Force projects satellite delivery in the second quarter of FY 2024.

International partner funding is being pursued for WGS-11+ ground updates specific to payload command and control, and launch. This funding is not assured until the amendment to the WGS multilateral Memorandum Of Understanding is signed. Letters of intent have been received from Luxembourg, Canada, The Netherlands, and New Zealand, indicating their intent to participate. An additional four letters of intent are expected.

There are no significant software-related issues with this program at this time.



### History of Significant Developments Since Program Initiation

History of Significant Developments Since Program Initiation	
Date	Significant Development Description
May 2000	JROC approved the WGS ORD May 4, 2000
November 2000	DAB authorized WGS to proceed into a combined Milestone II/Production phase November 6, 2000
January 2001	Contract (six Firm Fixed Price satellites) awarded to Boeing Satellite Systems in El Segundo, California January 2, 2001
October 2006	Block II (Space Vehicles 4-6) contract signed October 17, 2006
October 2007	WGS-1 successfully launched from Cape Canaveral Air Force Station (CCAFS) October 10, 2007
November 2007	Memorandum of Understanding (MOU) between the United States and Australia for WGS-6 signed November 14, 2007
April 2008	WGS-1 became operational
January 2009	IOC declared
April 2009	WGS-2 successfully launched from CCAFS April 4, 2009
August 2009	WGS-2 became operational
December 2009	WGS-3 successfully launched from CCAFS December 5, 2009
June 2010	WGS-3 became operational
August 2010	Initial Block II Follow-on contract awarded August 20, 2010
April 2011	WGS certified by USD(AT&L) as satisfying all provisions of Section 2366b of Title 10, United States Code
November 2011	ADM for WGS-9 signed November 1, 2011
December 2011	WGS-8 production option exercised December 16, 2011
January 2012	WGS-4 successfully launched from CCAFS January 19, 2012
January 2012	MOU with Canada, Denmark, Luxembourg, the Netherlands, New Zealand, and the United States for WGS-9 signed January 12, 2012
July 2012	WGS-10 production contract awarded July 27, 2012
July 2012	WGS delegated to the Air Force as an ACAT IC July 24, 2012
August 2012	WGS-4 became operational
May 2013	WGS-5 successfully launched from CCAFS May 23, 2013
August 2013	WGS-6 successfully launched from CCAFS August 7, 2013
December 2013	WGS-5 became operational
February 2014	WGS-6 became operational
May 2014	FOC declared
July 2015	WGS-7 successfully launched from CCAFS July 23, 2015
January 2016	WGS-7 became operational
December 2016	WGS-8 successfully launched from CCAFS December 7, 2016
March 2017	WGS-9 successfully launched from CCAFS March 18, 2017

April 2017	Wideband Digital Channelizer upgrade first implemented on WGS-8 completed on-orbit testing
April 2017	Czech Republic signed the multilateral MOU April 9, 2017 providing funds for access to the constellation
July 2017	WGS-8 became operational
July 2017	Norway signed the multilateral MOU July 4, 2017 providing funds for access to the constellation
October 2017	WGS-9 became operational
April 2018	FY 2018 Consolidated Appropriations Act directed procurement of WGS 11/12
June 2018	Request for Proposal released to Boeing for WGS 11/12
March 2019	WGS-10 successfully launched from CCAFS March 15, 2019
April 2019	WGS-11+ Undefined Contract Action (UCA) to allow Boeing to start work was issued April 19, 2019
November 2019	WGS-10 became operational
February 2020	WGS-11+ Contract awarded to Boeing Satellite Systems in El Segundo, California February 10, 2020

## Threshold Breaches

### APB Breaches

<b>Schedule</b>		<input type="checkbox"/>
<b>Performance</b>		<input type="checkbox"/>
<b>Cost</b>	RDT&E	<input type="checkbox"/>
	Procurement	<input checked="" type="checkbox"/>
	MILCON	<input type="checkbox"/>
	Acq O&M	<input type="checkbox"/>
<b>O&amp;S Cost</b>		<input type="checkbox"/>
<b>Unit Cost</b>	PAUC	<input type="checkbox"/>
	APUC	<input type="checkbox"/>

### Explanation of Breach

The procurement breach was reported during the December 2018 SAR.

### Nunn-McCurdy Breaches

#### Current UCR Baseline

PAUC	None
APUC	None

#### Original UCR Baseline

PAUC	None
APUC	None



## Schedule



Schedule Events				
Events	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate
Milestone II/Procurement (DAB)	Oct 2000	Oct 2000	Apr 2001	Nov 2000
Contract Award EMD/Production	Dec 2000	Dec 2000	Jun 2001	Jan 2001
Critical Design Review	Mar 2002	Mar 2002	Sep 2002	Jul 2002
IOC	Aug 2008	Aug 2008	Feb 2009	Jan 2009
FOC	Jun 2013	Feb 2014	Aug 2014	May 2014

### Change Explanations

None

### Notes

WGS met the following conditions for a successful FOC:

- Satellites 1-5 must be operating in their assigned orbital locations.
- Satellites 1-5 must be capable of supporting deployed military forces in each coverage area and have the ability to focus those coverage areas anywhere within the satellite Field of View.
- Satellites 1-5 must be fully capable of providing intra and inter-coverage connectivity and frequency cross-banding.
- Satellites 1-5 and the control system must be fully capable of providing S-band platform and payload control.
- Satellites 1-5 and the control system must be fully capable of providing X and Ka in-band satellite control in each satellite's operations region.
- Satellites 1-5 must be fully interoperable with existing DoD X-band and Global Broadcast Service Ka-band terminals.
- All program support needed to operate and maintain satellites 1-5 and associated mission control must be in place, to include: All operator, maintenance and software training completed, all training equipment and software delivered, all provisioning data delivered, all spares delivered, all depot support equipment delivered, all software maintenance documentation and maintenance support equipment delivered, payload equipment string delivered, and contractor anomaly resolution and software maintenance capability in place.



## Performance

Performance Characteristics				
SAR Baseline Production Estimate	Current APB Production Objective/Threshold	Demonstrated Performance	Current Estimate	
<b>Coverage</b>				
Capable of providing communications connectivity anywhere between 70 deg N and 65 deg S latitude and at all longitudes within each satellites field of view, 24 hrs a day	Capable of providing communications connectivity anywhere between 70 deg N and 65 deg S latitude and at all longitudes within each satellites field of view, 24 hrs a day	Capable of providing communications connectivity anywhere between 65 deg N and 65 deg S latitude and at all longitudes within each satellites field of view, 24 hrs a day	Confirmed by analysis using industry-standard Satellite Tool Kit. Operationally verified at 64° N latitude.	Capable of providing communications connectivity anywhere between 65° N and 65° S latitude and at all longitudes within each satellites field of view, 24 hrs a day.
<b>Capacity</b>				
Each satellite should provide a min throughput of 3.6 Gbps	Each satellite should provide a min throughput of 3.6 Gbps	Each satellite should provide a min throughput of 1.2 Gbps	Calculated simplex throughput of 4.186 Gbps*. Current average throughput is 2.1 Gbps.	Each satellite should provide a minimum throughput of ~2.14 Gbps.
<b>Access and Control</b>				
Provide platform and payload controlled capabilities to perform Launch and Early Orbit, On-Orbit Operations, Station-keeping, Satellite Repositioning, Platform and Payload Maintenance, and Anomaly Identification and Resolution	Provide platform and payload controlled capabilities to perform Launch and Early Orbit, On-Orbit Operations, Station-keeping, Satellite Repositioning, Platform and Payload Maintenance, and Anomaly Identification and Resolution	Provide platform and payload controlled capabilities to perform Launch and Early Orbit, On-Orbit Operations, Station-keeping, Satellite Repositioning, Platform and Payload Maintenance, and Anomaly Identification and Resolution	Positive platform and payload operator ratings.	Provide platform and payload controlled capabilities to perform Launch and Early Orbit, On-Orbit Operations, Station-keeping, Satellite Repositioning, Platform and Payload Maintenance, and Anomaly Identification and Resolution.
<b>Interoperability</b>				
Satellites must be fully inter-operable with existing and programmed DSCS and GBS terminals	Satellites must be fully inter-operable with existing and programmed DSCS and GBS terminals	Satellites must be fully inter-operable with existing and programmed DSCS and GBS terminals	Confirmed interoperability with 40 terminal types, including DSCS & GBS.	Satellites must be fully interoperable with existing and programmed DSCS and GBS terminals.

**Requirements Reference**

ORD 004-99 dated May 3, 2000

**Change Explanations**

None

**Notes**

\* Capacity demonstrated performance of 4.186 Gbps is based on a scenario of optimized ground terminal power/antenna aperture function. Interoperability demonstrated performance is based on testing with 40 terminals.

**Acronyms and Abbreviations**

deg - degrees  
DSCS - Defense Satellite Communications System  
Gbps - Gigabits per second  
GBS - Global Broadcast Service  
hrs - hours  
min - minimum  
N - North  
S - South



## Track to Budget

### General Notes

Budget documentations (i.e. P/R Docs) for program name remained unchanged; program began as "Wideband Gapfiller Satellites," but is now known as "Wideband Global SATCOM."

In December 2019, the Office of Management and Budget directed the DoD to establish new Space Force RDT&E and procurement appropriations. Beginning in FY 2021, space-related RDT&E funding, formerly under 3600F (RDT&E, Air Force) is contained in 3620SF (RDT&E, Space Force) and space procurement funding formerly under 3021F (Space Procurement, Air Force) is contained in 3022SF (Procurement, Space Force).

### RDT&E

Appn	BA	PE	
Air Force	3600	04	0603854F
Project		Name	
644811		Wideband Gapfiller Satellites	
			(Sunk)

### Procurement

Appn	BA	PE	
Air Force	3020	05	0303600F
Line Item		Name	
GAP000		Wideband Gapfiller Satellites	
			(Sunk)
Air Force	3021	01	0303600F
Line Item		Name	
GAP000		Wideband Gapfiller Satellites	
			(Sunk)
Air Force	3021	01	1203600F
Line Item		Name	
GAP000		Wideband Gapfiller Satellites	
			(Sunk)
Air Force	3080	03	0303600F
Line Item		Name	
836780		Wideband Gapfiller Satellites	
			(Sunk)

## Cost and Funding

### Cost Summary

Total Acquisition Cost							
Appropriation	BY 2010 \$M			BY 2010 \$M	TY \$M		
	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate	SAR Baseline Production Estimate	Current APB Production Objective	Current Estimate
RDT&E	417.2	417.2	458.9	444.3	380.7	380.7	409.6
Procurement	3193.4	3193.4	3512.6	3733.6 <sup>1</sup>	3159.0	3159.0	3807.0
Flyaway	--	--	--	3679.0	--	--	3752.6
Recurring	--	--	--	3679.0	--	--	3752.6
Non Recurring	--	--	--	0.0	--	--	0.0
Support	--	--	--	54.6	--	--	54.4
Other Support	--	--	--	54.6	--	--	54.4
Initial Spares	--	--	--	0.0	--	--	0.0
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	3610.6	3610.6	N/A	4177.9	3539.7	3539.7	4216.6

<sup>1</sup> APB Breach

#### Cost Notes

No cost estimate for the program has been completed in the previous year.

Total Quantity			
Quantity	SAR Baseline Production Estimate	Current APB Production	Current Estimate
RDT&E	0	0	0
Procurement	7	7	9
Total	7	7	9



## Cost and Funding

### Funding Summary

Appropriation Summary									
FY 2021 President's Budget / December 2019 SAR (TY\$ M)									
Appropriation	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
RDT&E	409.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	409.6
Procurement	3807.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3807.0
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2021 Total	4216.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4216.6
PB 2020 Total	4217.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4217.0
Delta	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4

#### Funding Notes

The Missile Procurement Air Force/Space Procurement Air Force funding profile identified in this SAR does not include \$64.0M (FY 2014 - FY 2017) for Commercial Satellite Communications Pathfinders.

Quantity Summary										
FY 2021 President's Budget / December 2019 SAR (TY\$ M)										
Quantity	Undistributed	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
Development	0	0	0	0	0	0	0	0	0	0
Production	0	9	0	0	0	0	0	0	0	9
PB 2021 Total	0	9	0	0	0	0	0	0	0	9
PB 2020 Total	0	9	0	0	0	0	0	0	0	9
Delta	0	0	0	0	0	0	0	0	0	0

## Cost and Funding

### Annual Funding By Appropriation

Annual Funding							
3600   RDT&E   Research, Development, Test, and Evaluation, Air Force							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
1999	--	--	--	--	--	--	0.7
2000	--	--	--	--	--	--	4.5
2001	--	--	--	--	--	--	77.7
2002	--	--	--	--	--	--	79.0
2003	--	--	--	--	--	--	--
2004	--	--	--	--	--	--	--
2005	--	--	--	--	--	--	31.7
2006	--	--	--	--	--	--	78.5
2007	--	--	--	--	--	--	28.5
2008	--	--	--	--	--	--	--
2009	--	--	--	--	--	--	9.8
2010	--	--	--	--	--	--	42.5
2011	--	--	--	--	--	--	56.7
Subtotal	--	--	--	--	--	--	409.6

Annual Funding 3600   RDT&E   Research, Development, Test, and Evaluation, Air Force							
Fiscal Year	Quantity	BY 2010 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
1999	--	--	--	--	--	--	0.8
2000	--	--	--	--	--	--	5.4
2001	--	--	--	--	--	--	91.6
2002	--	--	--	--	--	--	92.1
2003	--	--	--	--	--	--	--
2004	--	--	--	--	--	--	--
2005	--	--	--	--	--	--	34.7
2006	--	--	--	--	--	--	83.4
2007	--	--	--	--	--	--	29.5
2008	--	--	--	--	--	--	--
2009	--	--	--	--	--	--	9.8
2010	--	--	--	--	--	--	42.0
2011	--	--	--	--	--	--	55.0
Subtotal	--	--	--	--	--	--	444.3

Annual Funding 3020   Procurement   Missile Procurement, Air Force							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2001	--	24.6	--	--	24.6	--	24.6
2002	2	372.9	--	--	372.9	--	372.9
2003	1	184.1	--	--	184.1	--	184.1
2004	--	21.8	--	--	21.8	--	21.8
2005	--	35.4	--	--	35.4	--	35.4
2006	--	76.1	--	--	76.1	--	76.1
2007	1	428.7	--	--	428.7	--	428.7
2008	1	304.8	--	--	304.8	--	304.8
2009	--	50.4	--	--	50.4	--	50.4
2010	--	197.0	--	--	197.0	--	197.0
2011	1	517.0	--	--	517.0	--	517.0
2012	2	748.7	--	--	748.7	--	748.7
2013	--	25.1	--	--	25.1	--	25.1
2014	--	18.9	--	--	18.9	--	18.9
2015	--	29.1	--	--	29.1	--	29.1
Subtotal	8	3034.6	--	--	3034.6	--	3034.6



Annual Funding 3020   Procurement   Missile Procurement, Air Force							
Fiscal Year	Quantity	BY 2010 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2001	--	28.8	--	--	28.8	--	28.8
2002	2	429.1	--	--	429.1	--	429.1
2003	1	209.4	--	--	209.4	--	209.4
2004	--	24.3	--	--	24.3	--	24.3
2005	--	38.3	--	--	38.3	--	38.3
2006	--	80.0	--	--	80.0	--	80.0
2007	1	439.9	--	--	439.9	--	439.9
2008	1	307.2	--	--	307.2	--	307.2
2009	--	50.1	--	--	50.1	--	50.1
2010	--	193.0	--	--	193.0	--	193.0
2011	1	496.3	--	--	496.3	--	496.3
2012	2	706.9	--	--	706.9	--	706.9
2013	--	23.2	--	--	23.2	--	23.2
2014	--	17.2	--	--	17.2	--	17.2
2015	--	26.2	--	--	26.2	--	26.2
Subtotal	8	3069.9	--	--	3069.9	--	3069.9

Cost Quantity Information		
3020   Procurement   Missile Procurement, Air Force		
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 2010 \$M
2001	--	--
2002	2	643.0
2003	1	299.8
2004	--	--
2005	--	--
2006	--	--
2007	1	504.5
2008	1	435.6
2009	--	--
2010	--	--
2011	1	498.2
2012	2	688.8
2013	--	--
2014	--	--
2015	--	--
Subtotal	8	3069.9

Annual Funding								
3080   Procurement   Other Procurement, Air Force								
Fiscal Year	Quantity	TY \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2003	--	--	--	--	--	--	15.1	15.1
2004	--	--	--	--	--	--	10.8	10.8
2005	--	--	--	--	--	--	--	--
2006	--	--	--	--	--	--	--	--
2007	--	--	--	--	--	--	--	--
2008	--	--	--	--	--	--	--	--
2009	--	--	--	--	--	--	--	--
2010	--	--	--	--	--	--	1.6	1.6
2011	--	--	--	--	--	--	1.6	1.6
Subtotal	--	--	--	--	--	--	29.1	29.1

Annual Funding 3080   Procurement   Other Procurement, Air Force								
Fiscal Year	Quantity	BY 2010 \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2003	--	--	--	--	--	--	17.4	17.4
2004	--	--	--	--	--	--	12.2	12.2
2005	--	--	--	--	--	--	--	--
2006	--	--	--	--	--	--	--	--
2007	--	--	--	--	--	--	--	--
2008	--	--	--	--	--	--	--	--
2009	--	--	--	--	--	--	--	--
2010	--	--	--	--	--	--	1.6	1.6
2011	--	--	--	--	--	--	1.6	1.6
Subtotal	--	--	--	--	--	--	32.8	32.8

Annual Funding 3021   Procurement   Space Procurement, Air Force								
Fiscal Year	Quantity	TY \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2016	--	39.3	--	--	39.3	9.2	48.5	
2017	--	40.6	--	--	40.6	8.2	48.8	
2018	1	628.8	--	--	628.8	5.1	633.9	
2019	--	9.3	--	--	9.3	2.8	12.1	
Subtotal	1	718.0	--	--	718.0	25.3	743.3	

Annual Funding								
3021   Procurement   Space Procurement, Air Force								
Fiscal Year	Quantity	BY 2010 \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2016	--	34.7	--	--	34.7	8.1	42.8	
2017	--	35.1	--	--	35.1	7.1	42.2	
2018	1	531.6	--	--	531.6	4.3	535.9	
2019	--	7.7	--	--	7.7	2.3	10.0	
Subtotal	1	609.1	--	--	609.1	21.8	630.9	



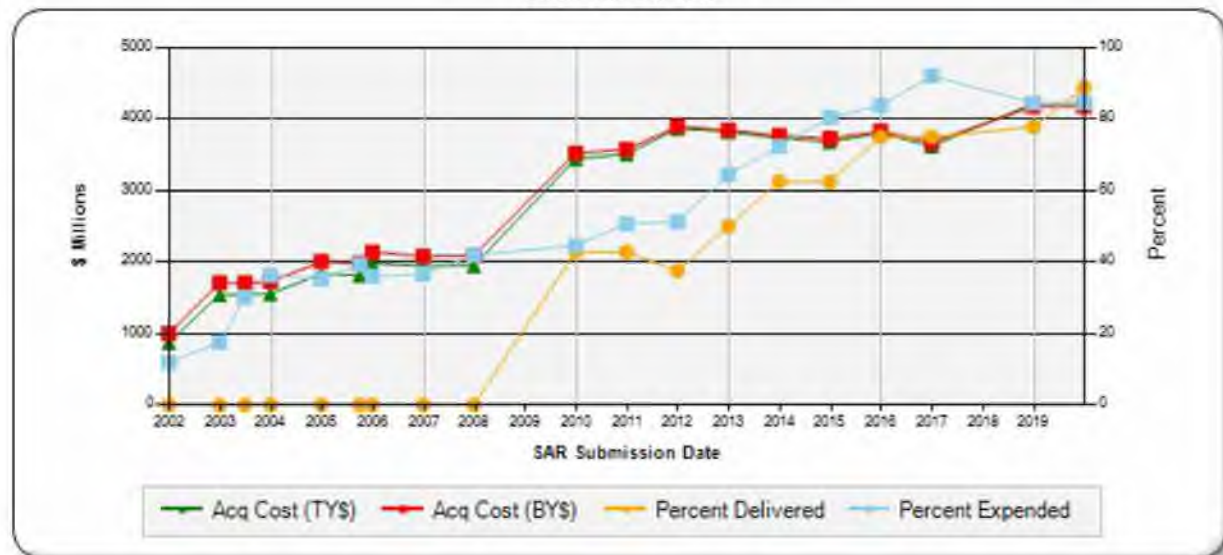
FY 2018 includes \$600M Congressional add for "full funding for WGS 11 and 12." The Space Force plans to deliver one enhanced WGS-11 with the operational capacity of two current WGS satellites; the Space Force assesses this as the best approach to delivering the directed additional WGS capacity in a cost effective manner.

Cost Quantity Information			
3021   Procurement   Space Procurement, Air Force			
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 2010 \$M	
2016	--	--	--
2017	--	--	--
2018	1	609.1	
2019	--	--	--
Subtotal	1	609.1	

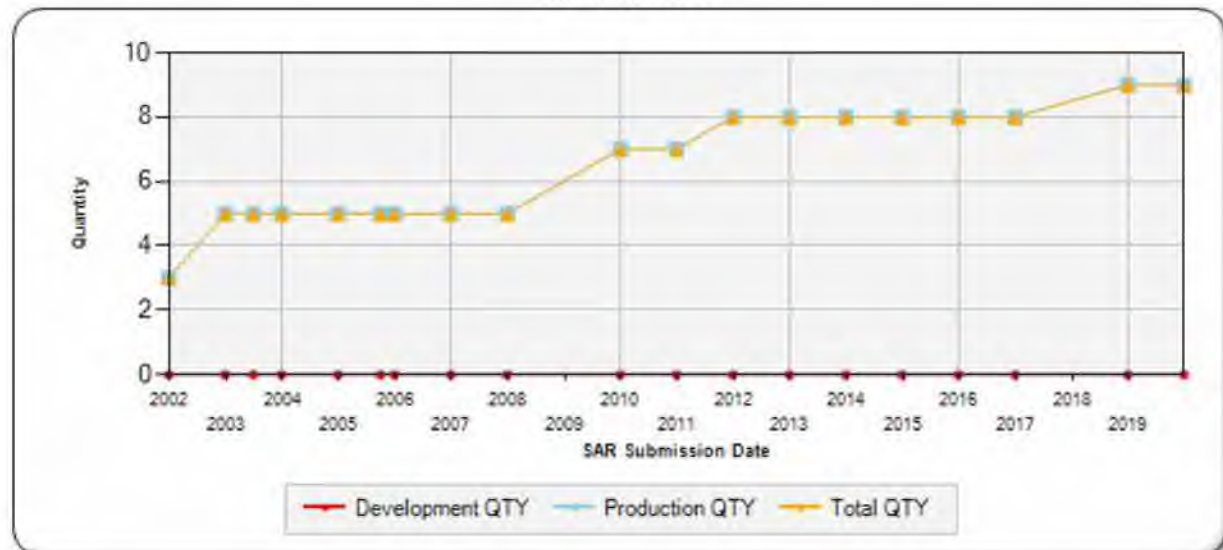
## Charts

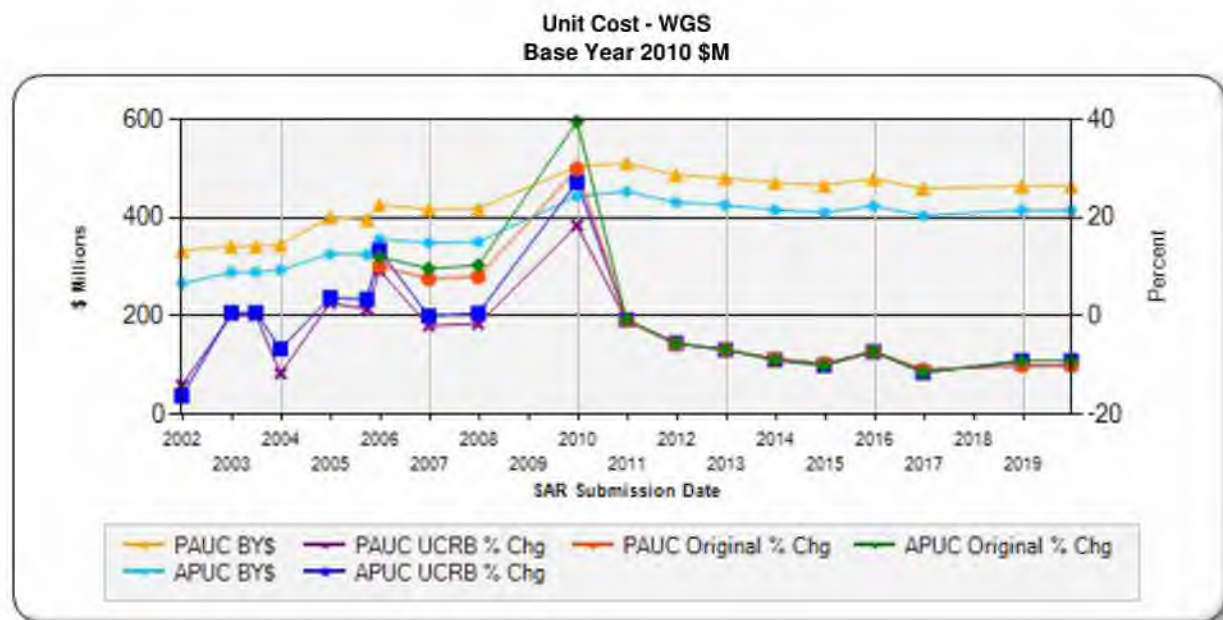
## WGS first began SAR reporting in September 2001

Program Acquisition Cost - WGS  
Base Year 2010 \$M



Quantity - WGS





## Risks

### Significant Schedule and Technical Risks

Significant Schedule and Technical Risks	
Current Estimate (December 2019)	
1.	The \$600.0M Congressional add for "full funding for WGS 11 and 12" prompted the Military Satellite Communications (MILSATCOM) Program Office to release an Request for Proposal to Boeing Satellite Systems (BSS) in June 2018; the Air Force began technical and cost evaluation of BSS's proposal at the end of January 2019 to evaluate interactions of the new hardware that will replace obsolete parts from the previous WGS design. The WGS-11+ Systems Requirements Review completed successfully on October 24, 2019. A lesson learned from the event was the need for cross-organizational coordination to ensure delivery timelines for satellite artifacts are consistent with need-dates of the ground and operator communities. The event demonstrated that the Government and the contractor have a common understanding of requirements and the program is ready to move towards the next stage. Preliminary Design Review is scheduled to occur in the third quarter of FY 2020.



## Risks

### Risk and Sensitivity Analysis

Risks and Sensitivity Analysis	
Current Baseline Estimate (March 2014)	
1.	There are no known cost risks with this program at this time.
Original Baseline Estimate (December 2000)	
1.	Total Acquisition Cost - \$2030.0M (FY 2000); Cost Analysis Improvement Group estimate - \$2210.0M (FY 2000); Risks - While DoD requirements for WGS have been relatively stable to this point in time, future changes in user requirements and system specifications will prove quite costly to the Department given the unusual and rigid commercial contracting strategy adopted for this program.
2.	Growing payload hardware of existing commercial items up to military specifications presents technical challenge.
3.	Satellite switching hardware development is on the critical path for payload development which could encounter schedule delays and additional contractor costs.
4.	Space segment software development has an ambitious development and integration schedule.
5.	The required capability for WGS to switch users between X and Ka-bands is not available in ordinary commercial services at this point in time.
6.	A 6-12 months delay in satellite delivery should not affect satellite constellation coverage nor result in space constellation gaps; however, the most important adverse effect would be a delay in the additional communication capacity provided by WGS satellites relative to the existing Defense Satellite Communication System and Global Broadcast Service constellations.
Revised Original Estimate (August 2010)	
1.	There are no known cost risks with this program at this time.
Current Procurement Cost (December 2019)	
1.	Total Acquisition Cost (BY10\$M) - \$4,177.4M (Qty 9); PAUC - \$464.156 (Qty 9); APUC- \$414.789 (Qty 9) The \$600.0M Congressional add for "full funding for WGS 11 and 12" prompted the MILSATCOM Program Office to release an Request for Proposal to Boeing Satellite Systems (BSS) in June 2018; the Air Force began technical and cost evaluation of BSS's proposal at the end of January 2019. The Space Force assesses that delivering one enhanced WGS-11 with the operational capacity of two current WGS satellites as the best approach to meeting the directed additional WGS capacity in a cost effective manner.

**Low Rate Initial Production**

There is no LRIP for this program.



## Foreign Military Sales

Country	Date of Sale	Quantity	Total Cost \$M	Description
Multilateral	1/12/2012	1	418.6	MOU with Canada, Denmark, Luxembourg, the Netherlands and New Zealand was signed on January 12, 2012 for the procurement of WGS-9 in exchange for access to the WGS constellation. Norway and Czech Republic signed the MOU on July 4, 2017 and April 9, 2017, respectively, and provided funds for access to the constellation.
Australia	11/14/2007	1	297.0	MOU between the DoD of the United States of America and the DoD of Australia concerning production, operations, and support of WGS was signed on November 14, 2007. Australia is providing funds for WGS-6 in exchange for access to the WGS constellation.

### Notes

The WGS program has no FMS; all sales in the table are International Cooperations.

Multilateral numbers include WGS-9 Channelizer upgrade.

Australia numbers reflect the final Boeing negotiated/settled cost for WGS-6.

### Acronyms and Abbreviations

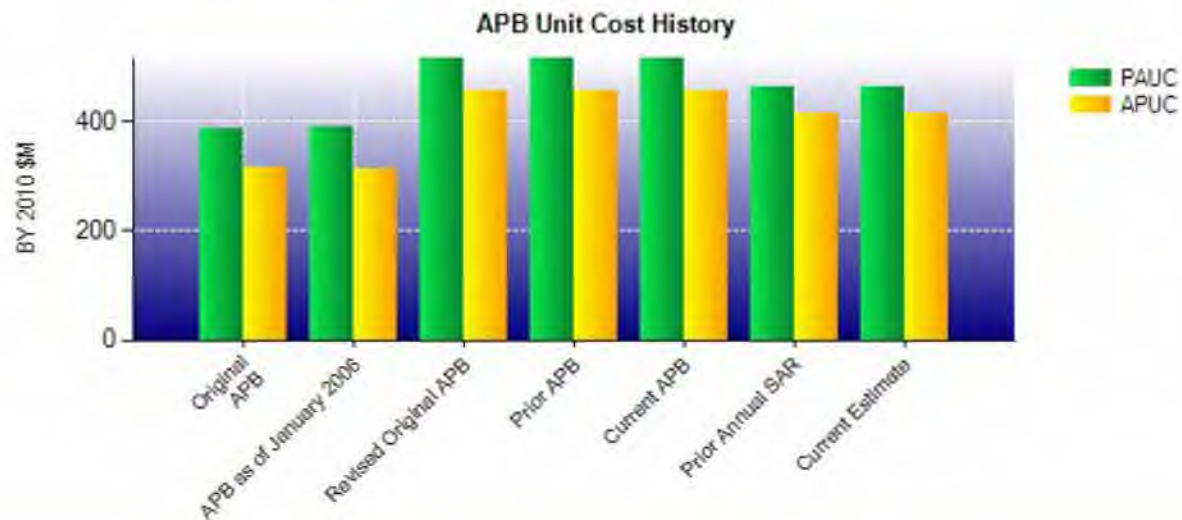
MOU - Memorandum of Understanding

**Nuclear Costs**

None

**Unit Cost**

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2010 \$M	BY 2010 \$M	% Change
	Current UCR Baseline (Mar 2014 APB)	Current Estimate (Dec 2019 SAR)	
Program Acquisition Unit Cost			
Cost	3610.6	4177.9	
Quantity	7	9	
Unit Cost	515.800	464.211	-10.00
Average Procurement Unit Cost			
Cost	3193.4	3733.6	
Quantity	7	9	
Unit Cost	456.200	414.844	-9.07
Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2010 \$M	BY 2010 \$M	% Change
	Revised Original UCR Baseline (Aug 2010 APB)	Current Estimate (Dec 2019 SAR)	
Program Acquisition Unit Cost			
Cost	3610.6	4177.9	
Quantity	7	9	
Unit Cost	515.800	464.211	-10.00
Average Procurement Unit Cost			
Cost	3193.4	3733.6	
Quantity	7	9	
Unit Cost	456.200	414.844	-9.07



APB Unit Cost History					
Item	Date	BY 2010 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Dec 2000	387.400	317.933	347.500	287.900
APB as of January 2006	Feb 2004	390.600	314.300	353.420	286.480
Revised Original APB	Aug 2010	515.800	456.200	505.671	451.286
Prior APB	Aug 2010	515.800	456.200	505.671	451.286
Current APB	Mar 2014	515.800	456.200	505.671	451.286
Prior Annual SAR	Dec 2018	464.200	414.833	468.556	423.044
Current Estimate	Dec 2019	464.211	414.844	468.511	423.000

### SAR Unit Cost History

Initial SAR Baseline to Current SAR Baseline (TY \$M)										
Initial PAUC Development Estimate	Changes								PAUC Production Estimate	
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total		
347.500	3.214	74.201	0.000	19.057	64.585	0.000	-2.886	158.171	505.671	

Current SAR Baseline to Current Estimate (TY \$M)										
PAUC Production Estimate	Changes								PAUC Current Estimate	
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total		
505.671	2.544	50.373	0.000	36.067	-128.922	0.000	2.778	-37.160	468.511	



Initial SAR Baseline to Current SAR Baseline (TY \$M)									
Initial APUC Development Estimate	Changes								APUC Production Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
287.900	2.786	108.257	0.000	0.000	55.229	0.000	-2.886	163.386	451.286

Current SAR Baseline to Current Estimate (TY \$M)									
APUC Production Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
451.286	2.467	62.458	0.000	36.067	-132.056	0.000	2.778	-28.286	423.000

SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone I	N/A	N/A	N/A	N/A
Milestone II	N/A	Oct 2000	Oct 2000	Nov 2000
Milestone III	N/A	N/A	N/A	N/A
IOC	N/A	Dec 2004	Aug 2008	Jan 2009
Total Cost (TY \$M)	N/A	1042.5	3539.7	4216.6
Total Quantity	N/A	3	7	9
PAUC	N/A	347.500	505.671	468.511

**Cost Variance**

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	380.7	3159.0	--	3539.7
Previous Changes				
Economic	+0.7	+22.7	--	+23.4
Quantity	--	+1464.7	--	+1464.7
Schedule	--	--	--	--
Engineering	--	+324.6	--	+324.6
Estimating	+28.2	-1163.3	--	-1135.1
Other	--	--	--	--
Support	--	-0.3	--	-0.3
Subtotal	+28.9	+648.4	--	+677.3
Current Changes				
Economic	--	-0.5	--	-0.5
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	--	-25.2	--	-25.2
Other	--	--	--	--
Support	--	+25.3	--	+25.3
Subtotal	--	-0.4	--	-0.4
Total Changes	+28.9	+648.0	--	+676.9
Current Estimate	409.6	3807.0	--	4216.6

Summary BY 2010 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	417.2	3193.4	--	3610.6
Previous Changes				
Economic	--	--	--	--
Quantity	--	+1276.7	--	+1276.7
Schedule	--	--	--	--
Engineering	--	+275.6	--	+275.6
Estimating	+27.1	-1012.0	--	-984.9
Other	--	--	--	--
Support	--	-0.2	--	-0.2
Subtotal	+27.1	+540.1	--	+567.2
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	--	-21.7	--	-21.7
Other	--	--	--	--
Support	--	+21.8	--	+21.8
Subtotal	--	+0.1	--	+0.1
Total Changes	+27.1	+540.2	--	+567.3
Current Estimate	444.3	3733.6	--	4177.9

Previous Estimate: December 2018

Procurement	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-0.5
Re-allocation of flyaway dollars to Support dollars to correct admin error in December 2018 SAR. (Estimating)	-21.8	-25.3
Revised estimate due to Air Force-wide funding adjustments (Estimating)	-0.3	-0.4
Adjustment for current and prior escalation. (Estimating)	+0.4	+0.5
Re-allocation of flyaway dollars to Support dollars to correct admin error in December 2018 SAR. (Support)	+21.8	+25.3
Procurement Subtotal	+0.1	-0.4



## Contracts

### Contract Identification

**Appropriation:** Procurement  
**Contract Name:** WGS-Block II Follow-On (SVs 7-10)  
**Contractor:** Boeing Satellite Systems, Inc.  
**Contractor Location:** 2260 Imperial Hwy.  
 El Segundo, CA 90245  
**Contract Number:** FA8808-10-C-0001/3  
**Contract Type:** Firm Fixed Price (FFP)  
**Award Date:** August 31, 2011  
**Definitization Date:** August 31, 2011

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
442.6	N/A	1	1927.3	N/A	4	1927.3	1927.3

### Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to the exercise of production options for satellites WGS-8, WGS-10 and WGS-11+.

### Cost and Schedule Variance Explanations

Cost and Schedule Variance reporting is not required on this (FFP) contract.

## Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	0	--
Production	8	8	9	88.89%
Total Program Quantity Delivered	8	8	9	88.89%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	4216.6	Years Appropriated	21
Expended to Date	3569.4	Percent Years Appropriated	100.00%
Percent Expended	84.65%	Appropriated to Date	4216.6
Total Funding Years	21	Percent Appropriated	100.00%

The above data is current as of February 10, 2020.

### Notes

Three satellites (WGS 1-3) on the Block I contract, two satellites (WGS 4-5) on the Block II contract, and three satellites (WGS 7, 8 and 10) on the Block II follow-on contract have been delivered to date.

A third satellite (WGS-6) on the Block II contract is funded by Australia and thus is not included in the APB costs, budgets, or quantities. Similar to WGS-6, WGS-9 is funded by international partners (Canada, Denmark, Luxembourg, The Netherlands, New Zealand, and the United States) and is also not included in the APB costs, budgets, or quantities. Norway and Czech Republic signed the Memorandum of Understanding on July 4, 2017 and April 9, 2017, respectively, and provided funds for access to the constellation.



## Operating and Support Cost

### Cost Estimate Details

**Date of Estimate:** December 13, 2013  
**Source of Estimate:** SCP  
**Quantity to Sustain:** 8  
**Unit of Measure:** Total Quantity  
**Service Life per Unit:** 14.00 Years  
**Fiscal Years in Service:** FY 2009 - FY 2030

A Request for Proposal for the addition of WGS 11 was sent to Boeing Space Systems in June 2018, proposal was delivered January 22, 2019, and contract was awarded February 10, 2020. An O&S update will be reflected the next SAR.

### Sustainment Strategy

Contract Logistics Support (CLS) has been provided by Boeing covering the whole system, via a Time and Material CLIN option exercised every calendar year as necessary. A separate CLS sustainment contract began January 1, 2015.

### Antecedent Information

The antecedent system is Defense Satellite Communication System (DSCS) III. The first DSCS III satellite was launched in October 1982 and the last DSCS III satellite was launched in August 2003. O&S effort for DSCS transitioned to Air Force O&M funding in FY 2005. Prior to this transition, on-going O&S for on-orbit DSCS satellites were part of missile procurement costs. O&S costs include all costs for operating, maintaining and supporting the DSCS assets (14 satellites and ground segment) for an assumed designed life of ten years.

O&S costs for DSCS are based on validated requirements from Air Force Space Command Logistics Support Requirements Brochures for the FY 2004 PB.

The antecedent DSCS program office estimate is from April 2002 finalized in Air Force Space Command's budget request to Headquarters Air Force.

Annual O&S Costs BY2010 \$M		
Cost Element	WGS Average Annual Cost Per Total Quantity	DSCS (Antecedent) Average Annual Cost Per Total Quantity
Unit-Level Manpower	8.909	0.000
Unit Operations	0.255	0.830
Maintenance	1.869	0.000
Sustaining Support	6.398	12.802
Continuing System Improvements	2.672	0.000
Indirect Support	4.165	1.304
Other	0.000	2.371
Total	24.268	17.307

Item	Total O&S Cost \$M			
	WGS			DSCS (Antecedent)
	Current Production APB Objective/Threshold		Current Estimate	
Base Year	546.7	601.4	533.9	173.1
Then Year	662.0	N/A	650.7	0.0

#### Equation to Translate Annual Cost to Total Cost

Total O&S Costs = Average annual cost x years to sustain = \$24.268M x 22 = \$533.9M

O&S Cost Variance		
Category	BY 2010 \$M	Change Explanations
Prior SAR Total O&S Estimates - Dec 2018 SAR	533.9	
Programmatic/Planning Factors	0.0	
Cost Estimating Methodology	0.0	
Cost Data Update	0.0	
Labor Rate	0.0	
Energy Rate	0.0	
Technical Input	0.0	
Other	0.0	
Total Changes	0.0	
Current Estimate	533.9	

#### Disposal Estimate Details

Date of Estimate:

Source of Estimate:

Disposal/Demilitarization Total Cost (BY 2010 \$M):

The disposal estimate is TBD.